

Camp Minden M6 Removal Camp Minden, LA

People & Technology Creating a Safer, Cleaner Environment

Clean Harbors-ECC Alternative Technology March 4, 2015



Technical Team Introduction



Lawrence Izzo, PE – Sr. Project Manager

- Environmental Engineer, 14 years Experience
- Remediation, Engineering Support, H&S Training



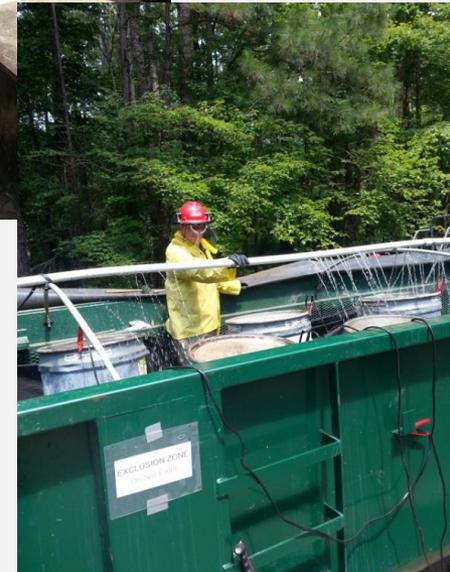
Michael Klosky, PE – Technical Manager

- Environmental/Chemical Engineer with 26 years experience in thermal and remediation engineering
- Executed over 230 environmental, thermal, remediation and UXO projects
- Additional Q&A MRD Technical Support Team
 - Mike Davis, Director, Munitions Response
 - Dan McFerrin, Sr. Program Manager, Munitions Response

Clean Harbors Remediation Division



- Remediation/removal projects nationwide for private and government sector
- Specialized Training
- Recent site experience at Camp Minden Site as part of separate Nitrocellulose removal
 - Safely removed ~850,000 lb of Nitrocellulose drums
- Clean Harbors Colfax, Louisiana Facility provides thermal treatment of Propellants, Munitions, Explosives



Munitions Response Capabilities



- 25 year record of successful performance of UXO operations including high risk contingency areas and domestic response
- Specific experience regarding high risk, unstable munitions in dangerous storage conditions
- Plan to use 3rd party explosives safety process review to supplement our experts in magazine download operations
- Prime contractor for ongoing Gov't project for the design and construction of a thermal treatment chamber for the safe, environmentally sound destruction of rocket motors



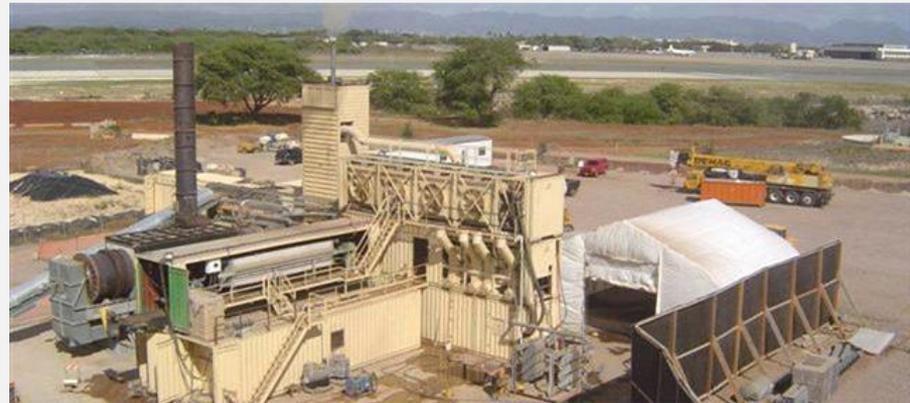
ECC completed clearance of Buckmaster Depot and Bayji ASP in Iraq

ECC destroyed 80,000,000 lbs of Iraqi Munitions in 18 months – averaging 200,000 lbs per day

Thermal Treatment Experience



- Experience executing complex thermal remediation projects since 1996
- Treated more than 10 billion pounds of hazardous materials contaminated with explosives, solvents, pesticides, or petroleum using:
 - Direct Fired
 - Indirect Fired
 - Low Temperature Thermal Desorption (LTTD)
 - Thermal Treatment Chamber
- Thermal process:
 - Reduces waste by >99%
 - Mobile & compact footprint
 - Recognized by EPA for over 20 years



ECC's designs have treated in excess of 20 tons per hour, meeting all emission standards.

Sampling of Thermal Projects			
Kosteny Rocket Base, Belarus, DSWA	1998	5,000 tons	Heavy fuel oil, VOCs & PAHs
Iowa Army Ammunition Plant, IA (USACE Omaha)	1995-2003	4,740 tons	VOCs, RDX
Confidential client, MA USACE New England	Ongoing	40,000 tons	RDX/HMX, Perchlorates
Confidential Client	2000 - Ongoing	1,200 lbs/hr	M6 Propellant
Robstown	2008 - Ongoing	68,000 tons Annually	Hazardous Waste
Letterkenny Munitions Center, PA	2009 - Ongoing	Live Testing Nov 2015; 10K cycles/year	Ammonium Perchlorate

Primary ARARs

(Applicable or Relevant and Appropriate Requirements)

- Our alternative technology approach has been designed to meet or exceed:
 - EPA Unilateral Administrative Order dated 18 March 2014
 - 40 CFR 63, Subpart EEE (National Emission Standards for Hazardous Air Pollutants from Hazardous Waste Combustors)
 - Chapter 7 LAC 33:III Ambient Air Quality Standards
 - Department of Defense (DoD) 6055.09-M-V5 Ammunition and Explosives Safety Standards



Treated more than 27,000 tons of PCB impacted soil to less than 1 ppm for the U.S. Navy with 90% uptime and 46,000 work hours without an injury

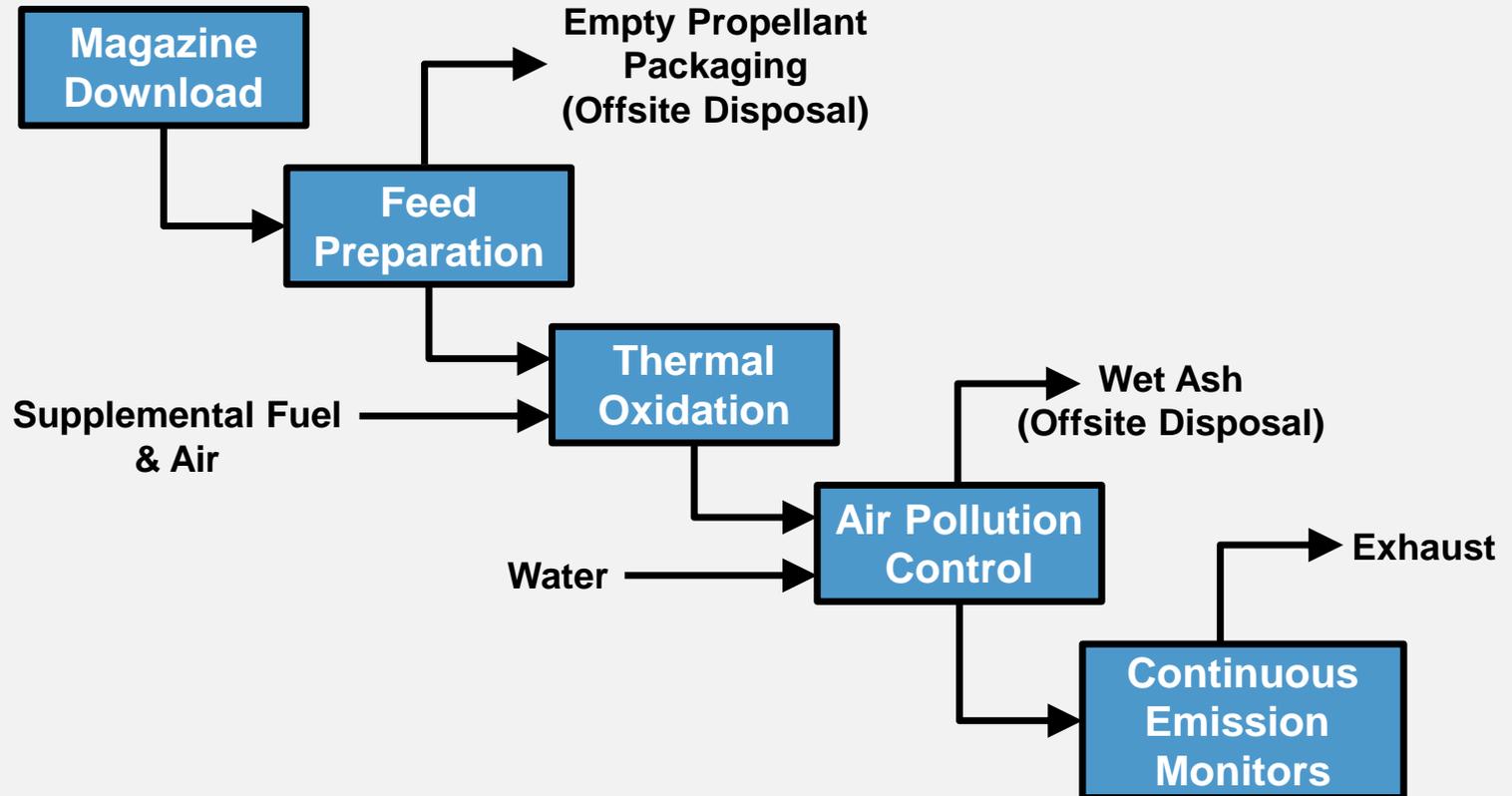
Technology Comparison



General Response Action	Threshold Criteria		Balancing Criteria				Cost
	Overall Protection	Compliance ARARs	Long-term Effectiveness	Reduction Toxicity/ Volume	Short-term Effectiveness	Implement-ability	
Feed Preparation w/Thermal Oxidizer(s)	●	●	●	●	●	●	TBD
Rotary Kiln, Fluid-bed or Moving Grate Incinerator	◐	◐	●	●	◐	◐	TBD
Super Critical Water Oxidation (SCWO)	●	●	●	●	◐	○	TBD
Open Burning / Open Detonation	◐	◐	●	●	●	●	TBD
Detonation Chamber	◐	●	●	●	○	○	TBD
Chemical Hydrolysis	◐	◐	◐	◐	●	●	TBD
Bioremediation	◐	◐	◐	◐	◐	○	TBD

● Meets Criteria
◐ Partially Meets Criteria
○ Does Not Meet Criteria

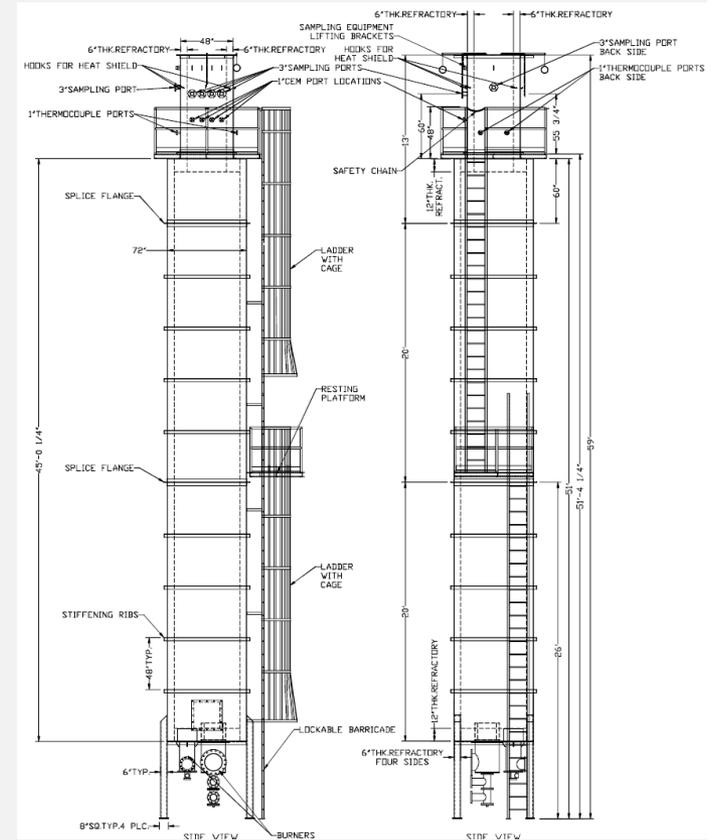
Simplified Process Schematic



Advantages of Thermal Oxidation



- Propellant preparation renders the material:
 - Safer to handle
 - More uniform for improved fuel-air mixing and emission control in thermal oxidizer(s)
- Oxidation temperatures of 1,600-1,800°F are:
 - High enough to achieve ARAR destruction efficiencies
 - Low enough to minimize NO_x formation
- Thermal Oxidation is proven technology using easily erected “off the shelf” equipment leading to faster project startup and completion



Thermal Oxidizer Emissions

(as measured at the stack)

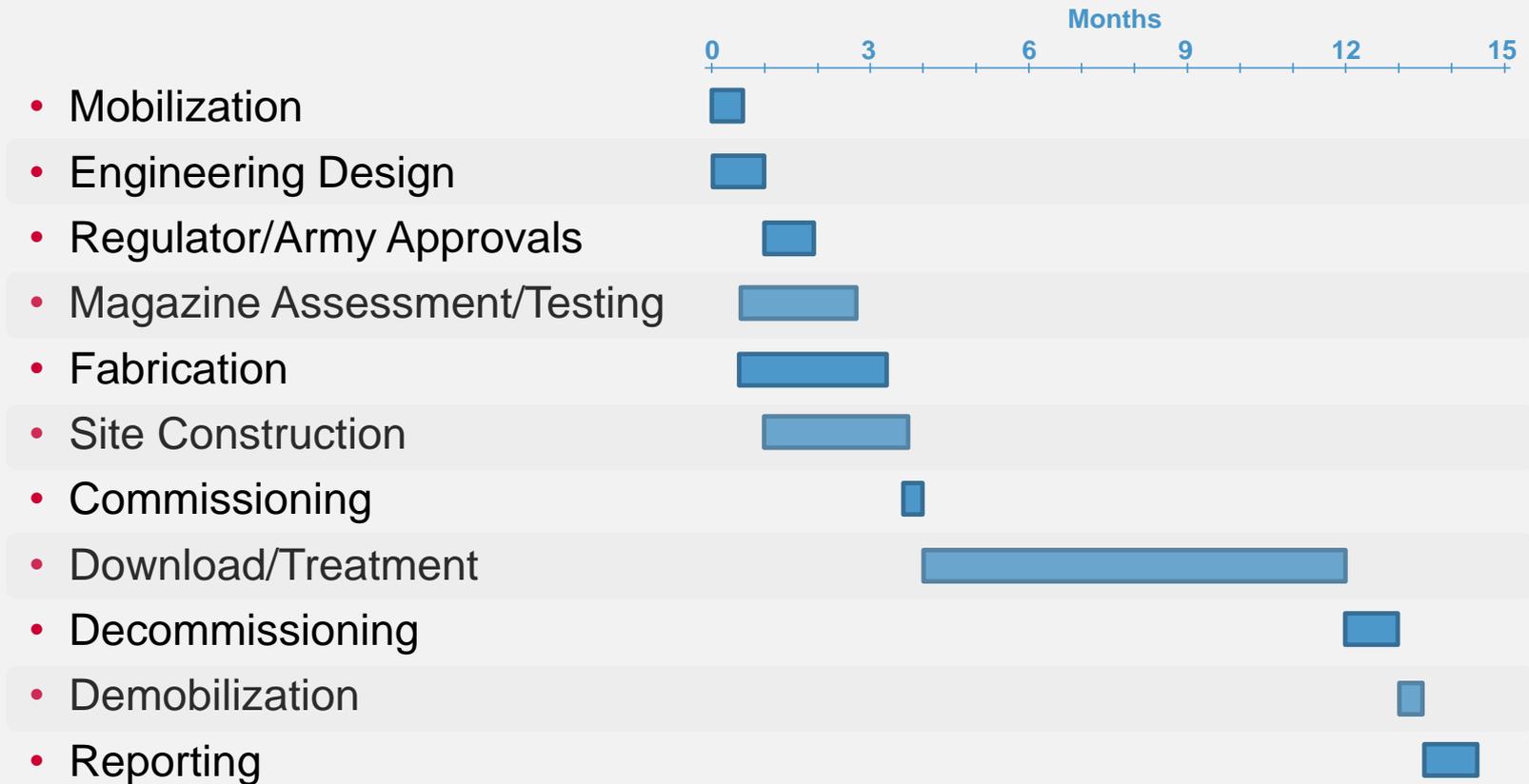


- Exhaust emissions will be less than ARAR standards:
 - Carbon Monoxide (CO) <10 ppmv
 - Total Hydrocarbon (THC) <5 ppmv
 - Individual Hazardous Air Pollutants (HAP) >99.99% Destruction and Removal Efficiency
 - Particulate Matter (PM) <0.0016 grains/dscf
 - Nitrogen Oxides (NO_x) <150 ppmv
 - Sulfur Dioxide (SO₂) negligible
 - *All emissions corrected to 7% O₂, dry basis
- Air dispersion modeling and monitoring will be used to demonstrate compliance with NAAQS at the Camp Minden boundary



Our thermal oxidizers employ staged combustion air to minimize NO_x emissions

Camp Minden Project Milestones



The CH-ECC Team Delivers



- Strong safety plan that includes 3rd party explosive safety services in all phases of the operation
- Over 50 years combined experience managing and remediating munitions and explosives
- Thermal oxidation meets or exceeds **all** Dialogue Committee criteria for technology evaluation
- Technical and execution approach will meet the completion schedule as dictated by the stakeholders and EPA Unilateral Administrative Order
- Team has site-specific experience with the Louisiana Military Department and Camp Minden, and understands stakeholder issues and concerns

Questions?



Peter Mondeel – Clean Harbors

Phone: 803-691-3478

Email: Mondeel.Peter@cleanharbors.com